



# Experimental Aerodynamic Facilities

## FEATURES:

### Wind Tunnels

- Subsonic Wind Tunnel, 2 test sections: 0.7m x 1.0m (up to Mach 0.2), 1.8m x 2.4m (up to Mach 0.03), open circuit, continuous flow
- Vertical Wind Tunnel, 2 test sections: 0.75m dia. (up to Mach 0.1), 0.5m dia. (up to Mach 0.3), open circuit, continuous flow
- Transonic Wind Tunnel, 0.5m x 0.5m test section (Mach 0.4 to 1.2), blow down
- Supersonic Wind Tunnel, 0.15m x 0.15m test section (Mach 1.5 to 3.8), blow down

### Compressed Gas Guns

- 8mm to 66mm (interchangeable barrels) dia. (launch 20g projectile at Mach 1.1)
- 76.2mm dia. spinning barrel (launch 681g projectile at Mach 1.1)
- 155mm dia. spinning barrel (launch 6.8kg projectile at Mach 1.1)
- Gator Gun for ground impact studies (launch velocities of approx. Mach .2)

### Fixtures

- Laboratory test fixture for non-rigid payloads flight simulator
- Radio-controlled airplanes and helium balloons for field test Support

The Edgewood Chemical Biological Center maintains and operates an Aerodynamic Research Laboratory with a unique array of experimental aerodynamic facilities and capabilities that include four wind tunnels, four compressed gas guns, and the expertise to design test fixtures for special "one-of-a-kind" tests. Specifically intended for applied research, they are adaptable to many different instrumentation and data acquisition arrangements, depending on the type of experimental information required.



Subsonic Wind Tunnel Flow Visualization  
Test of Smoke Through a Forest

Under controlled conditions, wind tunnels provide a means of determining the flight characteristics of airborne vehicles. Wind tunnels can also be used to determine the flow fields around air and ground vehicles, buildings, aerosol inlets, etc. The wind tunnel facilities include a wide range of measurement instrumentation: internal and external force and moment balances, pressure transducers, flow visualization techniques, and special static and dynamic test fixtures. Computerized data acquisition and analysis systems are integrated with the instrumentation and wind tunnels. Over the past few years, the lab's subsonic wind tunnel has been adapted to perform aerosol characterization studies of sampler inlets. The vertical tunnel permits free flight evaluations of aerial vehicles, and was recently used to improve the flight stability of a non-lethal munition. The lab personnel are experienced in wind tunnel model/instrumentation design. In conjunction with the aerodynamic facilities, lab personnel also have expertise in the use of a variety of computer codes, such as in-house trajectory programs to evaluate vehicle flight performance, non-rigid projectile stability codes, and projectile design software.

Compressed gas guns eliminate the need for pyrotechnics and explosives, thus providing a safe method to investigate the flight performance of projectiles and dissemination characteristics of experimental munitions as well as many other uses. The lab's four guns cover a range of calibers from 8 to 155mm. Two of the guns have spinning barrel capability, thus eliminating the need for rifling. The Gator Gun is a specialized test fixture for ground impact studies, which provides a means of evaluating a munition's functionality and penetration depth after impacting the ground. The small compressed gas gun has recently been fitted with a range of different barrels of various diameters to support a non-lethal munition program. Instrumentation supporting the compressed gas guns includes ballistic screens and high-speed video (up to 8,000 frames/sec).

Unique test fixtures can be designed and fabricated to support specialized test requirements. A laboratory test fixture for non-rigid payloads is available to determine the destabilizing effects of a liquid payload under simulated artillery flight conditions. A fleet of radio-controlled aircraft and helium balloons can be adapted to fit a variety of field test objectives.

Historically, the laboratory has extensive experience in several diverse areas of aerodynamics, aeroballistics, fluid dynamics, aerosol research, and non-lethal weapons testing.



For additional information on this facility, please E-mail [research.technology@sbccom.apgea.army.mil](mailto:research.technology@sbccom.apgea.army.mil).

For information on Technology Transfer applications, please contact us by E-mail ([technical.outreach@sbccom.apgea.army.mil](mailto:technical.outreach@sbccom.apgea.army.mil)) or by fax to 410-436-6529.